UNIVERSITY OF CALIFORNIA

BERKELEY • DAVIS • IRVINE • LOS ANGELES • MERCED • RIVERSIDE • SAN DIEGO • SAN FRANCISCO

SANTA BARBARA • SANTA CRUZ

OFFICE OF THE VICE PRESIDENT-
HEALTH AFFAIRS

OFFICE OF THE PRESIDENT
1111 Franklin Street
Oakland, California 94607-5200
Phone: (510) 987-9697
Fax: (510) 987-9715

May 4, 2007

Ms. Marlene Dortch, Secretary
Federal Communications Commission
445 12th Street, S.W.
Washington, DC 20554

RE: WC Docket No. 02-60

Dear Ms. Dortch:

The University of California is pleased to submit this application on behalf of the State of California for funding to support a proposed new statewide California Telehealth Network in response to the Federal Communication Commission's Order for the Rural Health Care Support Mechanism (FCC 06-144) released on September 29, 2006 (WC Docket No. 02-60).

If you have questions about the application feel free to contact me at (510) 987-9705 or Dr. Thomas Nesbitt, M.D., Executive Associate Dean at the UC Davis Health System (916) 734-1358.

Respectfully submitted on behalf of the University of California

Cathryn L. Nation, M.D.
Executive Director—Health Sciences
UC Office of the President

Governor Schwarzenegger
UC President Dynes
UC Provost Hume
UC Davis Chancellor Vanderhoef
UC Davis Dean Pomeroy
UC Davis Executive Associate Dean Nesbitt

Before the
Federal Communications Commission
Washington, D.C. 20554

In the Matter of	)	
	)	
Rural Health Care Support Mechanism	)	WC Docket No. 02-60

California Telehealth Network Proposal

Submitted By:

The University of California
Office of the President
1111 Franklin Street, Oakland, CA 94607

May 7,2007

Table of Contents

GOVERNOR ARNOLD SCHWARZENEGGER

May **3,2007**

The Honorable Kevin J. Martin
Chainnan
Federal Communications Commission
445 12th Street, SW
Washington, DC 20554

Re: ***California Application to FCC on Telemedicine Grant***

Dear Mr. Chairman,

As Governor of the State of California, I am pleased to endorse the University of California's application for the Federal Communications Commission Rural Health Care Pilot Program (FCC Pilot Program).

The accelerated deployment of broadband telecommunication technologies in California, specifically for use in telemedicine, is one of the top priorities of my administration. The FCC Pilot Program will complement and add great value to our State's Health Information Technology and Broadband Initiatives, which encourage public and private sector stakeholders to join with California's rural health care providers in developing a statewide telemedicine network.

The University of California will bring considerable resources *to* this effort. The UC Davis Center for Health and Technology is a national leader in the field of telemedicine and was recently awarded the prestigious "President's Award" by the American Telemedicine Association. Based in large part on UC's tremendous academic reputation, California voters approved **$200** million in resources last November that allowed the University to bring cutting-edge telemedicine training to expanded numbers of UC medical students.

Together with an investment from the California Emerging Technology Fund, these resources will enable California to better leverage the FCC's investment and help make quality health care more accessible to Californians living in rural areas. A successful implementation **of** the FCC Pilot Program in California will ultimately assist the FCC in bringing the benefits of broadband connectivity to healthcare providers and patients in rural areas across the nation. By linking them to California providers, including the world-class faculty at UC medical schools, rural areas throughout the country would have improved access to **the** newest treatments and techniques.

STATE CAPITOL • SACRAMENTO. CALIFORNIA 95814 • (916) 445-2841

Please consider the submission from the University of California as the state's application to the FCC Pilot Program. Beyond the University's groundbreaking work in the area of telemedicine, UC has an unmatched track record in successfully collaborating with public and private sector partners to produce forward-looking research and drive new technologies to market.

Thank you for your consideration of this application. We appreciate the opportunity to compete for federal funds that will provide much-needed assistance to those living in California's rural areas.

Sincerely,

Arnold Schwarzenegger

/bp

Before **the**
Federal Communications Commission
Washington, D.C. **20554**

In the Matter of	)	
	)	
Rural Health Care Support Mechanism	)	WC Docket No. 02-60

The California Telehealth Network Proposal

Introduction

The University of California is pleased to submit this application on behalf of the state of California for funding to support the statewide California Telehealth Network (CTN), pursuant to the Federal Communications Commission's (FCC) Order, in the matter of the Rural Health Care Support Mechanism, FCC 06-144, September 29,2006, ("Order").

The submission of this application in itself marks an important milestone for California's expanding statewide telemedicine efforts. As a result of the FCC's Order, a working group including major California institutions and stakeholders was formed and united with the common goal of creating a forward-looking, state-of-the-art telehealth network for California. This group includes California leaders and representatives of multiple offices and organizations, including the Office of Governor Arnold Schwarzenegger, several major state governmental entities responsible for health, business and telecommunications matters, the University of California (Office of the President and UC Davis Health System, as joint partners), non-profit organizations such as the California Emerging Technology Fund (CETF), and California public and non-profit health care providers, including existing regional rural health networks.

In response to the FCCs vision for developing a "ubiquitous nationwide broadband network dedicated to health care" that could "provide a rapid and coordinated response in the event of a national crisis," the above-named groups are working to forge new relationships that will support the successful development of a new statewide broadband telehealth network for California. As part of this effort, we have also worked together to seek additional sources of funding for the proposed network and to join together in preparing and supporting this application.

The California Context. California is often referred to as a "nation state" given its population of over 37 million people, and its vast geographic size (over 155,000 square miles) containing terrain that varies from steep mountains, to deserts, to agricultural valleys and delta farmland. The state has heavily urban areas such as Los Angeles, and the Greater San Francisco Bay Area, and San Diego, but the vast majority of the

land area of California is rural, and includes small towns in remote places that lack access to broadband networks and the full spectrum of health services that are readily available in the large urban areas of the state.

California is home to the Silicon Valley, Hollywood, the music industry, key West Coast ports, and a vital agricultural, fish, and wine industry. We have the most diverse population of any state, with both the benefits and challenges of multiculturalism, particularly as these relate to improving access to care for medically underserved groups and communities. With more than 5,700 licensed health care facilities statewide, our challenges are vast in attempting to achieve our vision for a statewide broadband network for health care.

Application Overview. While this application seeks to be as comprehensive as possible within the time constraints allowed, we understand that "the devil is in the details" and are prepared to continue with a focused planning process should our proposal be selected and approved for FCC funding. As part of these efforts we would engage immediately in a detailed planning phase to build upon the work already undertaken and to creatively and competitively address the many technical and programmatic details that will be required for success of the overall project.

Within this brief and introductory context, this application proposes development of a new network that will connect a total of 319 California health care sites. As envisioned, this includes a goal of connecting 126 sites in Year One, 89 sites in Year Two, and 104 sites in Year Three. Among these are 256 Rural Urban Commuting Areas (RUCA) clinic sites; 154 primary care clinics; 22 tribal clinics; 81 rural hospitals; 26 teaching hospitals, and one psychology clinic. Of these, 203 are located in designated Health Professional Shortage Areas (HPSAs). The sites are geographically distributed across California's 12 major regions, with an emphasis on underserved areas as designated by state and federal agencies.

Organization of the Application. The remainder of this application is organized in 11 sections, enumerated according to requirements specified in the FCC Order. As the proposal is reviewed, we hope the FCC will consider the unique and considerable challenges that California faces in improving access to health services across the state, as well as the shared commitment of our partnering organizations for building a new and innovative network dedicated to meeting current and future health needs.

1. Legally and Financially Responsible Organization

The University of California (UC), governed by a 26-member Board of Regents, will be legally and financially responsible for the implementation of the activities proposed in this application. The University of California Office of the President (UCOP) and the UC Davis Health System (UCDHS) will share responsibility for the management of the project and the development of the proposed new statewide network. The UC Office of the President, located in Oakland, California, will manage the overall grant, provide information required by the FCC as part of the grant, and facilitate the activities of partnering organizations and entities as outlined in the application. The UCDHS will serve as the technical network lead and provide the expertise necessary for assuring the successful development of new telemedicine programs statewide.

The UC Office of the President oversees and supports the activities of the 10-campus system, including undergraduate and graduate academic affairs, state and federal governmental relations, state and federal budget matters, legal issues, health sciences and clinical services, and the overall business and financial affairs of the system. The Office of the President manages the three national labs and oversees statewide agricultural and natural resources services based in all of California's 58 counties. The UC system operates the largest health sciences instructional program in the nation, annually enrolling more than 13,000 students in fifteen schools located on seven UC campuses. These programs generate more than one billion dollars annually in research funding and provide an extensive array of primary care and specialty services to millions of Californians each year. The University of California is statutorily designated as California's research university and has a long history of accountability and responsibility for management of both systemwide and statewide initiatives. The total General Fund (state-funded) budget for current operations in 2006-07 is more than $3.6 billion.

The UCDHS, located approximately 85 miles northeast of Oakland, will serve as the lead technical entity for the network. UCDHS has extensive experience in telehealth and continues to receive national recognition for the breadth, depth, and quality of its programs. In 2006, UCDHS's Center for Health and Technology (CHT) was awarded the American Telemedicine Association's President's Award for their advancement of telemedicine; breadth of telemedicine services; and effectiveness at improving the health of rural Californians. The UCDHS Telemedicine Program provides direct clinical care to patients at a distance through a variety of innovative telemedicine applications, including video-based consultations, emergency room and intensive care consultation, video-interpreting, quality assurance for sexual assault exams, telepharmacy, home telehealth, and store-and-forward services such as pediatric telecardiology. On an ongoing basis, UCDHS collaborates with a range of professionals including physicians, educators, information technology and communications specialists, scientific engineers and researchers to develop and evaluate information and telecommunications technologies that improve access to high quality patient care, information resources, and Continuing Medical Education (CME). Consultation services are available in more than forty specialties serving over 125 sites, approximately 85 of which are located in (or provide services to) rural areas. The UCDHS Telemedicine Learning Center's training program has educated approximately 1,200 health care professionals and executives. The Distance Education Program coordinates videoconferencing sessions among UCDHS clinical departments and affiliated programs and professionals throughout Northern California, the United States, and internationally.

2. Goals and Objectives of the Proposed Network

California is seeking participation in the FCC Rural Health Care Pilot Program to create a sustainable statewide network that provides rural California communities with access to a wide range of telemedicine and eHealth activities. The long-term vision for the state will be to develop an effective and forward-looking infrastructure that begins with a focus on rural communities and is subsequently expanded statewide to serve all California health providers. Participation in the proposed network will give rural facilities access to a broad range of health services, thereby providing significant near-term benefits to these communities.

While the overall vision is to create a ubiquitous statewide network, California's partnering institutions recognize the need to work toward this goal in phases. Given the state's large size and the challenges posed by geography and terrain, the pilot proposes an initial focus on 319 rural sites over a three-year period. Strong emphasis will be placed on infrastructure development, telecommunications quality and technical support, rather than mass deployment of older legacy technologies. Quality and reliability of the connections, rather than volume of sites connected, will be given highest priority during the early stages. Consistent with these goals, the project would first link six existing rural telemedicine networks together, including: the Central Valley Health Network, Community Clinics Health Network, Northern Sierra Rural Health Network, Open Door Community Health Network, Southern Sierra Telehealth Network, and the Indian Health Service. Thereafter, additional sites that lack connectivity and expertise with telemedicine would be added. These sites are located in areas that have shortages of health professionals and insufficient broadband penetration, including California's Central Valley, North Coast, and the Riverside-Imperial-San Diego County regions (see Section 6).

The initial number of sites selected is expected to be sufficient for identifying problem areas and regional challenges, yet at the same time be small enough to allow successful resolution of problems during the pilot phase. During each year of the project we expect to gain significant experience regarding how to best connect sites, train personnel, and resolve technical issues. This approach should also allow development and fine tuning of the protocol for connecting diverse new sites to the network in future years. We believe that the proposed total of 319 sites over a three-year period is a challenging yet achievable goal that would result in significant improvements in access to health services statewide. Throughout the project, both formative and summative evaluations will be performed. Results will be used to shape and refine the structure and function of the network, and to assess its overall impacts on delivery of telemedicine and telehealth services statewide. An in-depth discussion of the goals and objectives for the project, and an overview of the proposed design of the network are provided in the text that follows.

Goals and Objectives

> California's rural residents are older, poorer, and have dramatically fewer health resources than their urban counterparts. Scarcity of physician distribution, coupled with climatic, topographic, and distance factors, isolates rural residents from accessible and available services.
>
> - State of California *Website*

Goal One

Create a statewide broadband network dedicated to health care, connecting public and non-profit healthcare providers in California's rural and urban areas, and bringing the benefits of telemedicine to the areas of California where the needs are most acute

The proposed California Telehealth Network (CTN) is intended to improve access in rural and underserved areas to high quality, collaborative health services. The network will link California's rural health facilities to academic centers of excellence and to other non-profit and for-profit health providers. The CTN will also serve as a resource for emergency services and disaster preparedness. Objectives include:

- Building upon existing telemedicine networks and connecting health care providers who are currently unconnected to telemedicine services:
- Increasing the bandwidth capacity and number of telemedicine connections between California's health providers: and
- Creating a network that provides state-of-the art technology and security: high levels of reliability, scalability, and flexibility, and improved telecommunications quality for rural health providers.

California's Population and Geography. California is the most populous state in the country, with over 37 million residents representing 12% of the total U.S. population. According to the California Rural Health Policy Council, 92% of California's landmass is rural, but only 8% of the state's population (2.96 million) live in rural areas. Californians living in rural areas tend to have higher rates of unemployment and lower rates of health insurance coverage than their urban counterparts.

Immigration to California has increased dramatically in the last three decades. Approximately 1.45 million of the state's more than 3.8 million immigrants arrived within the last 16 years, including a large number who are agricultural workers. Hispanics will become the majority population in the state by 2040. California has the second-largest Asian population of any state and is home to the largest number of Native Americans in the country. More than 200 languages are spoken here, creating numerous challenges for assuring effective delivery of health services.

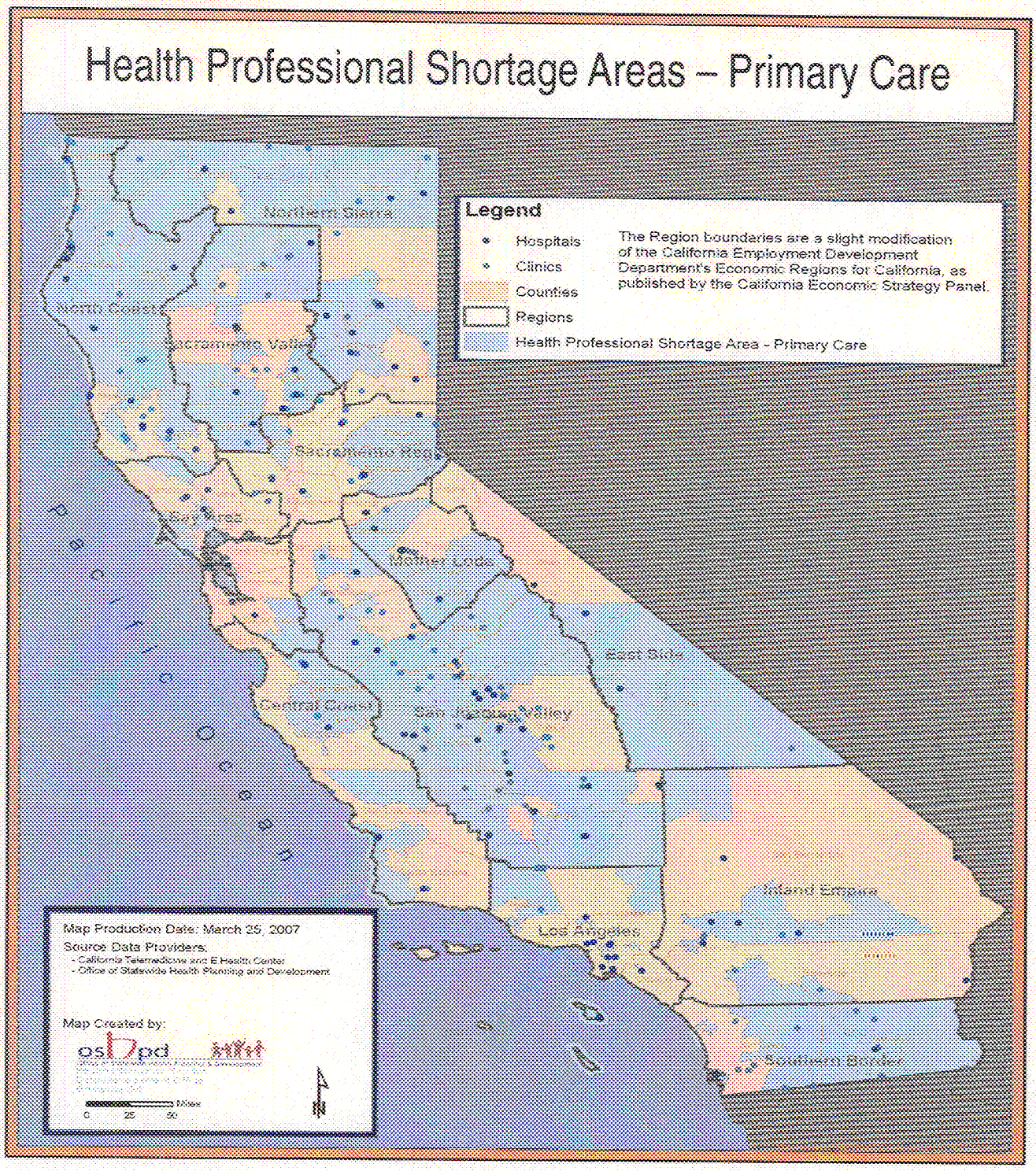
Rural Health Profile. Californians in rural areas suffer from more chronic conditions (including diabetes, hypertension, cardiovascular disease, asthma, and depression), are in poorer health, and experience more injuries than do those in urban and suburban areas. Those living in poverty are more likely to engage in unhealthy behaviors including smoking and physical inactivity, leading to obesity and other health problems. Patients in small rural towns may be particularly reluctant to seek local care for mental illnesses,

HIV/AIDS, or other "stigmatized illnesses. With the growing exodus of seniors moving from cities to rural communities, problems magnify as increasing numbers of aging Californians report poorer health outcomes. Geographic isolation and lack of public transportation pose further barriers to access. Because rural Californians may face hours of driving to reach any health facility, they are often less likely to seek preventive care and more likely to wait until their illness is severe before seeking help.

Challenges to Providing Telecommunications and Telemedicine to Rural California. Beyond financial and rate-related constraints, and difficulties in securing the participation of specialty providers, the barriers to expanded use of telecommunications in rural California currently include limited staff expertise and understanding of telecommunications and networks; limited ability to manage the technologies once they are put in place; limited technical support hours (typically limited to Monday through Friday during business hours); staff turnover; and the significant amount of paperwork required. For rural health providers to effectively participate in telemedicine, a reliable and well-supported infrastructure must be developed that recognizes and addresses the need for infrastructure management, technical support, and financial sustainability.

California's Health Infrastructure and Its Challenges. California has 531 hospitals, including 26 teaching hospitals (the five medical centers of the University of California; Stanford; University of Southern California, and 19 others). There are 81 hospitals in Rural Urban Commuting Area (RUCA)-defined sites. In addition to these hospitals, the state has 916 primary care clinics of which 154 are located in FCC designated rural areas. Fifty-three of California's 58 counties have at least one federally-designated Health Professional Shortage Area for Primary Care (HPSA-PC).

In even shorter supply are primary care providers who are willing to care for new Medi-Cal and other low-income patients. Shortages of medical specialists are increasing across California and are particularly acute in rural communities. Many physicians are not willing to locate in areas that do not have specialty backup. The proposed California Telehealth Network will increase access to bandwidth offering a seamless and secure means for providing a range of critically needed health services using a sustainable, cost-effective model for connecting specialists to rural areas.


Health Professional Shortage Areas – Primary Care
Legend
Hospitals
Clinics
Counties
Regions
Health Professional Shortage Area - Primary Care
The Region boundaries are a slight modification of the California Employment Development Department's Economic Regions for California, as published by the California Economic Strategy Panel.
Northern Sierra
North Coast
Sacramento Valley
Sacramento Region
Bay Area
Central Coast
San Joaquin Valley
East Side
Inland Empire
Los Angeles
Southern Border
Map Production Date: March 25, 2007
Source Data Providers:
- California Telemedicine and E Health Center
- Office of Statewide Health Planning and Development
Map Created by:
Miles
0
25
50

Goal Two

Link the California Telehealth Network to a nationwide backbone, creating greater access for the state's health care providers to continuing education, research, and peer networking

Objectives include:

- Linking new providers and existing California telehealth networks to the National LambdaRail and Internet2 systems pursuant to the FCC's Rural Health Care Pilot Program Order;
- Increasing opportunities for distance learning programs and research available to rural and remote providers;
- Increasing professional networking and peer support for medical providers; and
- Creating opportunity for continuity of operations in the event of a localized terrestrial network outage.

These objectives address the FCC's laudable goal of connecting all health care providers to the National LambdaRail and Internet2 systems. Many educational benefits would flow from interconnection of these systems, including: improved access to specialty consultations and backup for rural providers; improved ability to train medical students, nurses, and other health professionals in telemedicine applications; and expanded access to continuing education for California health care providers. Although all licensed medical providers are required by law to complete a specified number of Continuing Medical Education (CME) credits each year, the travel time required for rural providers to meet these requirements takes considerable time away from direct patient care activities. The proposed new network will expand and enhance access to CME and Continuing Health Education (CHE) programs that are provided by UC's five academic medical centers and other California centers of excellence.

Goal Three

Leverage and build upon California's historic and recent investments in telehealth

Over the past several years, California has been increasingly recognized as a telemedicine and eHealth leader. California was one of the first states to allow Medicaid reimbursement for telemedicine and eHealth services. Growing numbers of providers are now using telemedicine and eHealth technologies in a variety of ways to benefit patient care. Between 1997 and 2007, the California Telemedicine & eHealth Center (CTEC), a statewide resource center, invested more than $23 million in re-granting projects to facilitate the growth of telemedicine and eHealth across the state. Funded through grants to CTEC from the California Endowment, California HealthCare Foundation, Blue Shield of California Foundation, and the federal Office for the Advancement of Telehealth, these resources have supported the development of regional eHealth networks and provided funding for technical support and training. California has also benefited from substantial public and private sector investment in telemedicine programs. Noteworthy examples include the growing UCDHS telemedicine program, expanding governmental efforts with the Indian Health Service's telemedicine programs, and the robust Blue Cross of California Telemedicine Network.

Currently in California, a set of regionally-based telemedicine networks provide services in more than 30 specialty areas and deliver a wide range of health education services for both rural providers and patients. Other telemedicine networks have been established and growing numbers of telehealth applications are being developed by private health organizations such as Sutter Health, Kaiser Permanente, and Catholic Healthcare West. These networks provide videoconferencing telemedicine units and other means of sharing information between rural facilities, hospitals, public health departments and other sites in rural counties, enabling providers to consult with specialists in urban areas and participate in CME seminars. The existing networks are also utilized to support regional health care provider meetings and to facilitate efforts toward development of regional health care delivery systems.

Recent California Telemedicine Initiatives. Over the past several years, a number of new and exciting initiatives have been launched in California to advance the use of telecommunications and health care technology. Significant among these are Governor Schwarzenegger's Health Information Technology (HIT) Executive Order (S-12-06, signed July 2006) which allocates $240 million to achieve full information exchange between health care providers and stakeholders within ten years, including a sustainable business model for a statewide eHealth network connecting rural health facilities to California medical centers using telemedicine and other technologies. In October 2006, Governor Schwarzenegger also signed Executive Order S-23-06, which established a broadband task force to promote broadband access and usage particularly in medically underserved areas. One working group of the task force is dedicated to health issues.

In 2005, after mergers of SBC-AT&T and Verizon-MCI, the California Public Utilities Commission (CPUC) formed the California Emerging Technology Fund, with $60 million in donations from the merged entities. CETF is a non-profit organization whose mission is to leverage its funds to achieve ubiquitous access to broadband and advanced services for California using emerging technologies within five years. CETF has pledged up to $3.6 million to match any FCC grant received in response to this application. A letter from the CETF President and CEO is included with other letters of support in Appendix G. The California Teleconnect Fund, administered by the CPUC, also provides an ongoing 50% discount to eligible government-owned and operated hospitals and non-profit health clinics.

As recently as November 2006, California voters passed Proposition 1D, which provides $200 million in bond funding to support infrastructure changes necessary to increase the medical student class size at UC's five medical schools and to develop and expand telemedicine programs throughout the state. While this new funding provides new resources for capital and equipment only, this funding will enable UC to invest in new facilities and state-of-the-art equipment to develop and expand new telemedicine programs and to improve the skills of future California providers. These new telemedicine efforts will be targeted toward medically underserved communities and aligned with other statewide efforts. A summary table describing these initiatives follows.

Initiative	Amount	unction/Mission
Governor's Health IT Executive Order (5-12-06, signed July 2006)	$240 million	To achieve full information exchange between health care providers and stakeholders within ten years, including developing a sustainable business model for an eHealth network connecting rural health care facilities to medical centers throughout the state using telemedicine and other technologies.
Governor's Broadband Executive Order (S-23-06, signed October 2006)		Establishes a broadband task force bringing together public and private stakeholders to: remove barriers to broadband access, identify opportunities for increased broadband adoption, and enable the creation and deployment of new advanced communication technologies. The task force focuses on ways that broadband can be used to substantially benefit educational institutions, health care institutions, community-based organizations, and governmental institutions. The task force includes a number of working groups including a health care working group. Several members of the task force and working group have been involved in developing this application, providing a broad spectrum of expertise to help create a new statewide model and plan.
California Emerging Technology Fund (established by the CPUC)	$60 million	To achieve ubiquitous access to broadband and advanced services in California through the use of emerging technologies by the year 2010.
California Teleconnect Fund (Decision 96-10-066, October 1996) (administered by the CPUC)	$25 million (FY 2007-2008)	To provide an ongoing 50% discount on telecommunications services to qualifying schools, libraries, government-owned and operated hospitals and health clinics, and community based organizations
Proposition 1D (new bond funding for UC medical schools, approved in November 2006)	$200 million	To fund infrastructure to class size in UC medical schools and expand telemedicine programs throughout the state. This will include new resources for facilities and state-of-the-art equipment for increased enrollments in new Programs in Medical Education (PRIME), aimed at improving health care for currently underserved communities in California

USDA-RUS Grant. In 1998, the UCDHS received a grant from the United States Department of Agriculture Rural Utilities Service (USDA-RUS), which provided funding for UCDHS *to* support 22 new end-user telehealth sites in rural northern California. In addition to delivery of clinical specialty services, the project provided primary and urgent care to schools in underserved communities and education to health care providers in geographically isolated rural communities.

USAC. The Universal Services Administrative Company (USAC) program continues to play an important role in developing California's telemedicine and telehealth infrastructure. Over the history of the Rural Health Care Support Mechanism, California health care providers have received nearly **$2** million in discounted communication services, with almost half of this received in the past two years. In 2006, $500,000 was disbursed to telecommunication providers for services provided in California, an increase from the $456,000 received in 2005.

As California works to achieve its future vision for a ubiquitous statewide telehealth network, funding from the FCC for the proposed pilot would enable the state to build upon the Governor's recent Executive Orders relating to health and broadband deployment. Funding for the pilot will also enhance and help effectively leverage statewide efforts relative to the California TeleConnect Fund (administered by the California PUC),

the California Emerging Technologies Fund (focused on bridging the digital divide as to broadband), and new telehealth efforts by the UC system supported by Proposition 1D.

Goal Four

Utilize the California Telehealth Network for ongoing disaster preparedness training

Objectives include:

- Assisting state and local government, business, and other community organizations in improving skills for effective emergency management, basic preparedness and response training courses for public employees that may be tasked to help in the event of an emergency;
- Assisting in response exercises to link health providers throughout California, monitoring possible outbreaks and helping operate public health laboratories;
- Providing health-related alerts and notifications to health care providers throughout California; and
- Providing a mechanism for communication and facilitation of functions related to major emergencies and/or disasters, including counseling services for victims and first responders.

The State of California has assisted local governments, business, community organizations and others in developing effective emergency management and disaster preparedness programs and training. California has been a leader in this area and its processes have been utilized as the basis for the National Incident Management System (NIMS) guidelines. The California Telehealth Network will significantly enhance the capacity and efficiency of emergency communication networks within California.

The California Department of Health Services (CDHS) is responsible for preparing the state for public health emergencies such as natural disasters or other crises such as bioterrorism. Responsibilities range from monitoring possible disease outbreaks to operating state-of-the-art public health laboratories to training exercises that test the state's level of preparedness in responding to an array of emergencies. California's public health departments, health care providers, first responders and hospitals are vital partners in helping our state prepare for a public health emergency. These partners are responsible for emergency preparedness and response at the local level. The backbone of California's public health system is a network of public health departments in each of California's 58 counties and three that operate as city health departments in Berkeley, Long Beach and Pasadena. Hospitals and health care providers are also essential partners in California's preparation for and response to public health emergencies.

The California Telehealth Network would become an important tool in meeting the federal requirement to provide basic preparedness and response training courses to public employees who may be needed to work in the event of an emergency. In addition, the CTN would be an important tool for emergency preparedness as it would be used in response exercises to link health providers throughout California. Through the connection with the Department of Health Services Office of Emergency Preparedness, the CTN would serve a key role in providing alerts and notifications to health providers throughout California. In the event of an emergency, the CTN would play an important role in recovery by facilitating the delivery of important health services such as treatment and/or counseling for victims and first responders.

Goal Five

Report back to the FCC on the State of California's pilot program as to lessons learned regarding access to advanced services for public and non-profit health providers, and suggested revisions to the FCC's current rural health rules

Consistent with the FCC's request for information for future rulemaking regarding how best to enhance access to advanced services for public and non-profit health care providers, the pilot will conduct both formative and summative evaluations throughout the project period. Results will be used to shape and refine the structure and function of the network; assess its overall impacts on delivery *of* telemedicine and telehealth services statewide; and offer feedback about lessons learned and suggested revisions to the FCC's current rural health rules.

Proposed Network Design

The California Telehealth Network will provide a telecommunications infrastructure that will offer seamless telecommunications to increasing numbers of (and eventually most, if not all) rural health care providers in California. At the regional network level, rural providers and specialty referral hub sites will digitally communicate with other connected health providers within the state and across the nation

The California Telehealth Network has a number of strategic objectives that drive the proposed network design. Significant among them are California's commitment to:

- Provide for statewide geographic coverage to health care facilities;
- Broadly deploy bandwidth and Quality of Service (QOS) capabilities that provide high quality support for commonly used telemedicine applications (e.g., videoconferencing). A minimum baseline circuit capacity would be designated at the T1 level; however, it is recognized that for some health care providers, additional capacity may be required depending on the telemedicine applications utilized;
- Maximize the number and geographic distribution of participants connected during the pilot project Currently, there are 256 providers that meet the RUCA requirements for designation as a rural provider. The proposed network has a goal of connecting more than 300 sites over a three year period;
- Create a statewide, highly interoperable, logically "flat" network which, to the extent possible, leverages existing infrastructure and services. The specific goal will be to remove logistical impediments to rapid and extensive deployment within a short time span;
- Develop a network architecture such that as broadband services, dedicated fiber infrastructure, and other capacity or bandwidth enhancements become available within a region, they can be integrated into the network without extensive topological reorganization of the entire network;

- Be vendor neutral – not requiring features or functionality that cannot be supplied by multiple vendors. This is intended to assure adequate participation during a competitive bidding process and to promote cost-effective implementation;

- Design a network that offers technical and infrastructure capabilities possessed by multiple vendors. This will assure adequate participation during a competitive bidding process and promote cost-effective implementation; and

- Utilize and employ a flexible design that will conveniently interoperate with other regional, state, and national routed networks.

The proposed network design will integrate the latest in technology and security into a state-of-the-alt infrastructure that meets strategic objectives. It will differ from a standard routed network intended primarily for non-critical administrative use in that it will provide a higher level of service and will incorporate the following features:

- High Availability: The network will operate 24 hours/day, seven days/week, with a high level of hardware and circuit redundancy, configured such that when a failure occurs, network traffic is rapidly rerouted and service continues with minimal disruption;

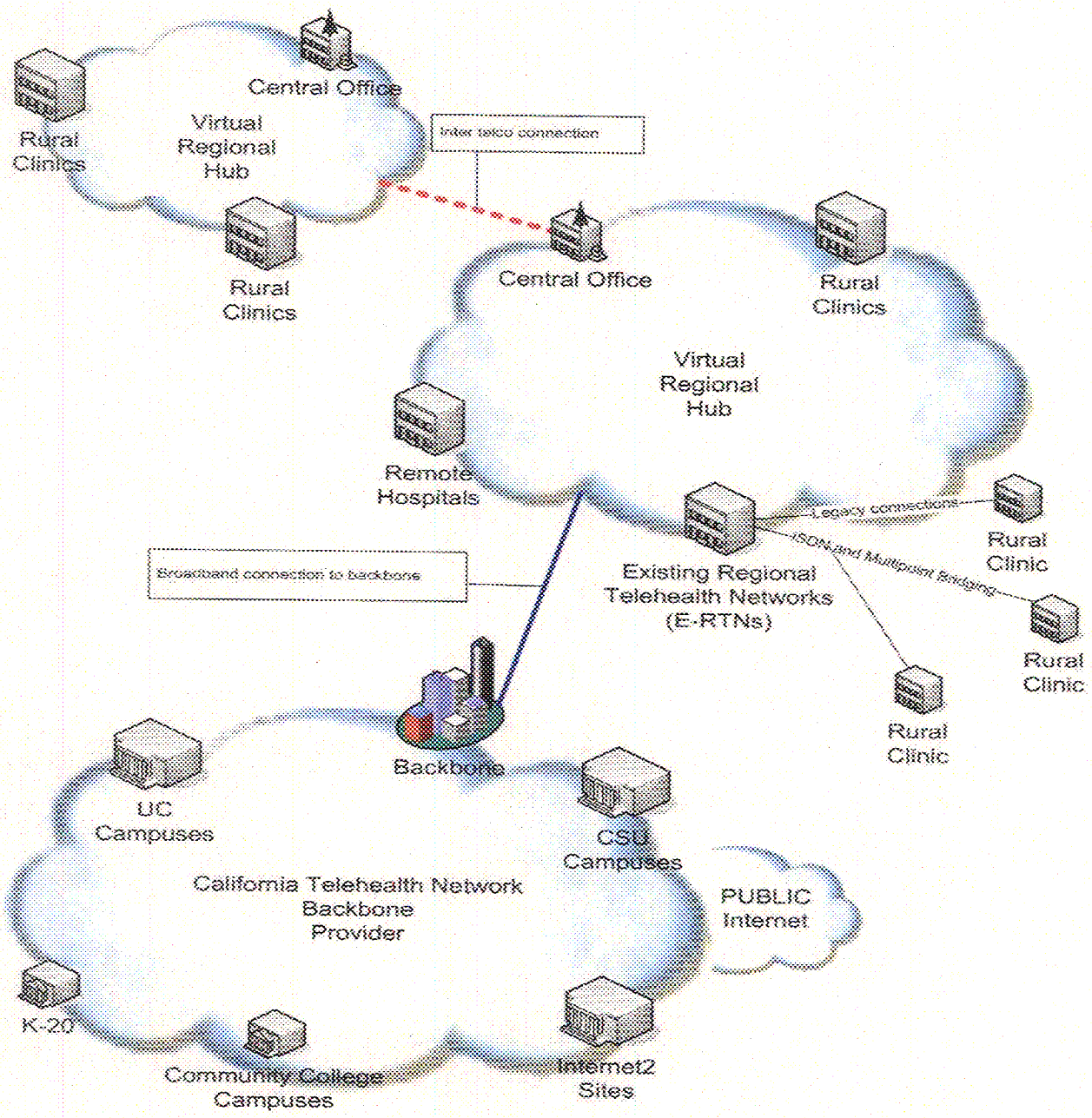
- Quality of Service Capabilities: The network will have end-to-end quality of service for telemedicine and other resource-intensive applications. A process will be developed to identify and mark certain types of traffic, which then give that traffic preferential priority as it is routed throughout the network. Traffic may be divided into two levels of priority: video (high priority), and data (low priority);

- Traffic Prioritization: The network will include guaranteed bandwidth allocation for a designated traffic type (e.g., video and data), regardless of aggregate traffic volume;

- Very Low Latency Variability and Guaranteed In-Sequence Packet Delivery: The network will support low latency variability and guaranteed in sequence packet delivery to be provided via stable, precisely-timed transmission of packets, delivered in the order in which they were sent; and

The proposed California Telehealth Network will integrate infrastructure and services from a number of communications providers selected during a competitive RFP process including commercial telecommunications ("telco") carriers, intra- and inter-state educational and non-profit and for profit network service providers, satellite service vendors and others. The proposed network will connect to the National LambdaRail and Internet2 networks, as required by the FCC Order.

The figure below illustrates a high-level conceptual view of the proposed California Telehealth Network infrastructure. A more detailed technical description of the proposed network is included in Appendix A, including a description of proposed terrestrial network design and proposed satellite network infrastructure that may also be deployed to provide: redundancy, and an alternative where terrestrial service is too costly or impractical. If this proposal is funded, California's partnering organizations will perform a detailed initial study phase to develop the best possible design for the network. We are committed to utilizing new technologies that will be cost-effective in meeting overall objectives for the network and the sites to be served.


Central Office
Rural Clinics
Virtual Regional Hub
Inter telco connection
Rural Clinics
Central Office
Rural Clinics
Virtual Regional Hub
Remote Hospitals
Legacy connections
ISDN and Multipoint Bridging
Rural Clinic
Broadband connection to backbone
Existing Regional Telehealth Networks (E-RTNs)
Rural Clinic
Rural Clinic
Backbone
UC Campuses
CSU Campuses
California Telehealth Network Backbone Provider
PUBLIC Internet
K-20
Community College Campuses
Internet2 Sites

Technical Assistance for Network Participants

During the pilot there will be one network operations center; however, the project team will investigate best practices for communication as the California Telehealth Network expands and may add strongly linked network operations centers that seamlessly share information. The existence of only one network operations center at first will be critical for providing efficient and quality technical assistance to participating rural sites.

The California Telehealth Networks network infrastructure, however broadly geographically dispersed, must be accessible to centralized, real-time continuous monitoring. Due to the geographically dispersed nature of the proposed California Telehealth Network across up to 155,000 square miles, potentially traversing multiple telecommunications common carriers and numerous private network linkages, there is a potential for "balkanization" of support and monitoring among multiple regional entities. Many years of experience supporting telemedicine at UCDHS has demonstrated that "fractured" support leads to inefficient, inconsistent, and unreliable services. This is recognized as one of our challenges for the project.

During the initial phases of implementation, a centralized network monitoring facility will be established, tentatively sited at the UC Davis Medical Center, in Sacramento, California. To the maximum extent possible, network status information in the form of SNMP feeds, will be collected from the various network providers and participant sites. The information will be consolidated and monitored using sophisticated monitoring tools (e.g., HP Openview) that provide a global topological view of the entire network. The center will be staffed 24/7 by qualified network technicians, who will monitor California Telehealth Network's status and performance. Connectivity or performance problems will be quickly identified, the appropriate vendor or regional site staff will be notified, and problem resolution will be tracked and logged using effective problem tracking methodologies. The Center will also prepare regular reports on network utilization and performance on a global and per site basis.

Centralized support resources are highly effective in network monitoring and tracking problem resolution; however, they are not sufficient to deal with the myriad of network, equipment and application problems that can be expected to occur throughout the highly geographically dispersed California Telehealth Network. One of the values of integrating the six regional telehealth networks (see Section Nine) into the CTN is that it will be possible to leverage the existing support infrastructure and operations experience that the regional telehealth networks provide. The existing regional telehealth networks (E-RTN) all offer some level of first-line technical support. Therefore, a large number of rural telemedicine sites participating in this project will be able to call a regional help desk that is familiar with their systems and can provide a triage function to determine the nature of the problem. Operational experience by both UCDHS and the rural telehealth networks shows that most technical problems are not related to the telecommunications networks, but to other equipment issues at either the remote site or the specialty hub. If needed, the help desks at the E-RTNs can dispatch technicians in a timely manner to assist the rural health care sites that are connected or closest to them. The E-RTNs will provide first-level technical support to resolve technical problems not related to the network. In the event that there are problems with the telecommunications network, the technical support staff at the rural hub sites will call the centralized network support call center for assistance.

Technical assistance for network participants will be provided before deployment, at the time of installation,

and post-installation, by staff from the central network support center or the E-RTNs. Detailed processes, procedures, documentation and training will be developed during the planning phase of the CTN pilot program. The following elements are desirable:

- Pre-deployment: Assistance will include needs analysis, technical site assessments and training (technical and process) for remote site technicians so that they are fully trained to provide the expected level of support and are cognizant of processes and procedures for problem escalation and resolution prior to site installation;

- Installation: Sites approved for installation will be pre-verified for expected level of site preparation prior to equipment installation with technical assistance available should an issue arise during installation; and

- On-going support: A 24/7 technical support line will be available. Calls to the support line will be routed to the help desk of the associated regional hub during normal business hours for tier 1 and 2 technical support and triage. Problems with the telecommunications network will be directed back to the centralized network support call center for resolution with the associated telecom providers.

Rural health care sites not affiliated with an E-RTN will call a proposed centralized network support site that will triage the call to determine the nature of the problem. The CTN will decide how to optimize technical support to these sites during the planning phase.

Access to New Technologies

The California Telehealth Network will provide more of California's health care providers with access to new technologies in areas such as in-home monitoring, teleconsultation, and other cutting-edge health care services.

The University of California currently has thousands of research and development projects across the ten-campus system that could potentially be of benefit to users of the California Telehealth Network. UC research efforts in technology transfer, telecommunication, nanotechnology, biotechnology and genomics garner more federal, National Science Foundation (NSF), and other research support than any other university system. The proposed California Telehealth Network will eventually allow access for the state's health care providers to innovations currently being developed within UC in the areas of:

- High end technologies that allow teleimmersion and telepresence in Intensive Care Units (ICUs);

- Integration and processing of very large streams of data and very large numbers of streams of data from sensors, video devices, and consumer devices all of which are used to deliver various aspects of health care;

- Wearable sensors, integrated into consumer devices, facilitating delivery of remote monitoring, care-at-a-distance, and real time telemetry; and

- Other technologies allowing teleconsultation, teleradiology and distributed clinical trials.

University of California, Berkeley (UCB)'s Center for Information Technology Research in the Interest of Society (CITRIS) has developed information technologies for emerging regions, modifying currently available technology so that it can operate at long distances and under harsh conditions. The program has successfully set up technologies that deliver 6-7MB/s speeds over 60 miles, running on solar energy, in Africa and India. They are now focused on rural areas in the U.S. and believe they can go as far as 300 miles, with good quality of service. CITRIS also has a 10-year NSF funded center, the Team for Research in Ubiquitous Secure Technologies (TRUST), which among other things examines data security in the delivery of remote health care. The CTN would, for UC researchers at CITRIS and elsewhere also offer a unique and controlled testbed for studying optimization of distributed work (i.e., studies to determine the best optimization of cost, service and convenience when multiple providers are seeking services from each other).

University of California, Los Angeles (UCLA) resources available to the California Telehealth Network include its National Library of Medicine training program in medical informatics; the UCLA Biomedical Informatics Center (UBIC), which houses a range of interdisciplinary educational and research efforts across the campus; provides exposure to novel, world-class telemedicine research: fosters interaction between clinicians, medical informaticians, computer scientists, and electrical engineers; and provides outstanding programs in tele-oncology and stroke management.

University of California, San Diego (UCSD)'s Stroke Center Long-Distance Consultation program is a model developed in partnership with CalIT2 that utilizes enhanced, broadband wireless internet technology to allow real-time consultation with the UCSD stroke team over long distances, capturing and delivering live, high-quality patient video and audio across Internet connections. The UCSD stroke team, using a wireless, laptop computer, participates in the physical exam while it is taking place, consulting with the community physician and advising in administration of appropriate drugs. Models such as these being developed throughout the UC system will become more widely available statewide.

Other potential linkages for members of the CTN include mobile applications that leverage broadband wireless access and with personal telehealth solutions, such as those being created by industry consortia including the Continua Health Alliance; and technologies developed at the U.S. Army's Telemedicine and Advanced Technologies Research Center (TATRC) in Marina del Rey, California. TATRC has played a key role in the advancement of telemedicine in this state by building collaboration between government, academia, and industry to develop a wide range of cutting edge telemedicine and health technologies. Recent key initiatives supported by TATRC include Medical Robotics, Imaging Technologies, Advanced Prosthetics, Computational Biology, Remote Monitoring, as well as advanced Simulation and Training Technologies

3. Estimated Network Costs per Year

The following table includes the proposed preliminary budget for the costs allowed under the FCC Rural Health Care Pilot Program over a three year period. The budget estimates for terrestrial broadband do not include the cost of pulling fiber to sites located in areas that currently do not have broadband access. The assessment of these costs will be obtained during the planning phase of the pilot, as they can then be assessed on a case-by-case basis. The Sustainability Plan (see Section 11) contains additional information regarding how the costs associated with the enhanced use of telemedicine services, enabled by increased access to advanced telecommunications and information services, will be covered.

Uses	Description	Year 1	Year 2	Year 3
				$0
	will be used to determine: the needs of the rural sites in the state that could provide telemedicine services; and the basis for revising this preliminary budget in order to deploy an efficient statewide telehealth network that uses various technologies.			
Non-Recurring Costs: Deploying transmission facilities and advanced telecommunications and information services	Estimated costs of deploying both terrestrial broadband (fiber) and satellite broadband for connection between urban medical centers, teaching hospitals and rural health care sites. Provides telecommunications connectivity at the rural health care sites. This is either initial equipment for new users or upgrades for current users to expand quantity and quality of telemedicine services.	$3,425,000	$3,625,000	$3,625,000
• Terrestrial Telecommunications Equipment and Services Sub-total	Includes capital equipment such as routers.	$1,925,000	$3,625,000	$3,625,000
Satellite Telecommunications Equipment and Services Sub-total	Includes capital equipment such as satellite terminals.	$1,500,000	$0	$0

Estimated Recurring Costs:		**$9,375,000**	**$9,375,000**	**$9,375,000**
▪ Terrestrial Sub-total	Includes ongoing operational, technical support and service costs	$7,875,000	$7,875,000	$7,875,000
▪ Satellite Sub-total	Includes ongoing operational, technical support and telecommunication service costs	$1,500,000	$1,500,000	$1,500,000
Totals		**$13,000,000**	**$13,000,000**	**$13,000,000**

4. For-Profit Network Participation

It is anticipated that non-public and for-profit private providers and managed health systems will be able to contribute to the success of the pilot project and the development of a comprehensive statewide telemedicine system. Such participation will help ensure long-term sustainability of the system by providing resources for maintenance, expansion and upgrades for the network, and improvement and expansion of the telehealth and telemedicine services. The pilot project intends to pursue discussions with health care providers such as Stanford University, Childrens' Hospitals, and Kaiser Permanente Health Plan, as well as for-profit organizations such as Blue Cross, Blue Shield, United Health, and Sutter Health, to explore the feasibility of their participation. Whenever a non-USAC-eligible health care provider or for-profit organization is part of the network, the service provider will directly invoice that entity for its share of the service. Use and subscription by non-public and for-profit private providers will be subject to:

- Commitment in writing by the non-public and for-profit providers to the development of the statewide network that will enhance the delivery of health care to rural and remote communities in California;
- Payment (on a timely basis) of the proportionate full cost of the use of the network without any direct or indirect subsidy from the FCC grant; and
- Agreement to participate, as requested, in the providers' work group of the Program Advisory Board to ensure continuous improvement to the statewide telemedicine system.

The following guidelines for allocating costs have been reviewed and would likely be employed:

Service or Connections Where Usage is Tracked. Service providers and health providers will itemize the services for which the health providers plan to apply for discounts in their contracts/agreements. Where usage is tracked by the service provider, the provider will itemize the bill so that costs attributable to eligible health providers are readily identifiable and the discount for each eligible provider is specified on the bill. The bill submitted by the service provider will identify the pre-discount price of eligible services.

Service or Connections Where Usage Is Not Tracked. It may not be feasible to track usage in order to allocate costs among eligible and non-eligible entities. In those cases, the advisory board and lead agency in purchasing the common service or connections will agree in advance about how to allocate costs based on their estimated relative use of the resulting service. The allocation methodology will be based on a usage measure, examples include:

- Number of connections (trunks, lines or wireless connections) operated by each member; and
- Number of connections (trunks, lines or wireless connections) operated by each member and periods of time of operation for the trunks, lines or wireless connections (a proxy for minutes of use).

The allocation methodology will be set forth in the contract/agreement for services executed with the service provider. If there is no contract for services (as may be the case for tariffed or month-to-month services), the health care provider will provide the service provider with a copy of its allocation methodology. The methodology for allocating costs may be established permanently, or it may be reviewed periodically. This methodology will be documented as part of the record keeping responsibilities of